BROOKHAVEN NATIONAL LABORATORY RESEARCH FACILITIES

The following research facilities are currently operational or in development at Brookhaven National Laboratory (BNL):

1. The Relativistic Heavy Ion Collider (RHIC) facility complex consists of:

    a. Relativistic Heavy Ion Collider Ring
    A high energy accelerator in which two beams of ions or polarized protons are brought into collision in order to study the state of matter formed in the first microseconds of the Universe and to study the spin structure of the proton.

    b. Alternating Gradient Synchrotron (AGS)
    The AGS is the final stage of the accelerator injector chain which accepts beam from the Booster and then accelerates ions and polarized protons to the minimum RHIC energy. The AGS then injects the beam into the two accelerator rings that comprise RHIC.

    c. Booster Accelerator
    The Booster accepts ions from the Tandem Van de Graaffs and protons from the LINAC, which then accelerates the beam to the minimum AGS energy before injecting the beam into the AGS. The Booster also supplies beam to the NASA Space Radiation Laboratory (NSRL).

    d. Linac
    A linear accelerator, fed by the Tandem, supplies beams of protons and polarized protons for the RHIC injector system, the Booster for NSRL, and the production of medical isotopes at the Brookhaven Linac Isotope Producer (BLIP) facility.

    e. Tandem Van de Graaff
    The Tandem Van de Graaff electrostatic accelerators are the sources of ions for the RHIC accelerator injector chain, starting with the Booster. Also used to supply ions for radiation testing of electronic components and for manufacturing of industrial items.

    f. Electron Beam Ion Source (EBIS)
    EBIS is a new compact state-of-the-art pre-injector system being constructed for the RHIC and NASA Space Radiation Laboratory science programs and will replace the Tandem Van de Graaff.

    g NASA Space Radiation Laboratory (NSRL)
    NASA is working with BNL to understand the risks to human beings exposed to space radiation through the study of radiobiological

effects, using beams of heavy ions that simulate the cosmic rays found in space. NSRL features its own beam line dedicated to radiobiology research, as well as state-of-the-art specimen-preparation areas

2. National Synchrotron Light Source (NSLS)
   The NSLS operates two electron storage rings: an X-Ray ring and a Vacuum UltraViolet (VUV) ring which provide intense light spanning the electromagnetic spectrum from the infrared through x-rays. Each year over 2300 scientists from universities, industries and government labs perform research at the NSLS.

3. National Synchrotron Light Source II (NSLS II)
   NSLS-II is a new state-of-the-art storage ring designed and being constructed to replace NSLS and will deliver world leading brightness and flux with top-off operation for constant output. The facility will be able to produce x-rays up to 10,000 times brighter than those produced at the NSLS. Design and engineering of the new light source began in 2007 and construction and operations are expected to begin in 2009 and 2015, respectively.

4. Center for Functional Nanomaterials (CFN)
   This Center provides researchers with state-of-the-art capabilities to fabricate and study nanoscale materials. Work at the Center has the potential to form the basis of new technologies.

5. Other facilities:

   a. High-Field Magnetic Resonance Imaging (MRI) Facility
      Used for human medical imaging studies, this facility houses a nuclear magnetic resonance instrument with a 4 Tesla whole-body magnet capable of generating one of the highest field strengths in the world for human study.

   b. Accelerator Test Facility (ATF)
      The Accelerator Test Facility is used to explore new ideas on particle acceleration and the production of brighter x-ray beams for research applications.

   c. Positron Emission Tomography (PET) Facility
      The PET facility is used to image the brain for studies on the treatment of addictions, the aging process and drug research and development.

   d. Laser Electron Accelerator Facility (LEAF)

A picosecond laser-electron accelerator facility at BNL's Center for Radiation Chemistry Research.

e. Cyclotrons
The 60-inch cyclotron and 40-inch “medical” cyclotron are used for the production of radiotracers for use in PET and MRI studies.

f. Transmission Electron Microscope (TEM)
This 300 kV field emission electron microscope is a unique probe for materials characterization.

g. Scanning Transmission Electron Microscope (STEM)
This custom-built electron microscope is optimized for imaging unstained biological molecules with minimal radiation damage.